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THE PLANT DISEASE REPORTER

Issued by

THE PLANT DISEASE SURVEY, DIVISION OF MYCOLOGY AND DISEASE SURVEY
BUREAU OF PLANT INDUSTRY, AGRICULTURAL RESEARCH ADMINISTRATION
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The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

IN THIS ISSUE

The use of vine lifters on dusting machines in tomato fields may result in an unusual spread of mosaic, according to M. B. Linn and H. W. Anderson, page 470.

The incidence and control of potato late blight in Oregon is reported by C. E. Owens, page 471.

J. A. Pinckard contributes a note on diseases of soybeans and peanuts in Mississippi, page 472.

W. Winfield Ray reports on cotton boll rots in Oklahoma in 1942, page 473, and on the rate of application of Ceresan to cotton seed, page 474.

Preliminary evidence suggests that guayule may be resistant to the root-knot nematode, according to Wm. G. Hoyman, page 476.

Incidence of tobacco diseases in Maryland in 1942 is reported by E. A. Walker, page 477.

Stem rust on wheat was more severe in Virginia than for the past 10 years, according to S. B. Fenne, reporting on this and other diseases of small grains, page 478.

Check list revision by Freeman Weiss, page 480.

SPREAD OF THE COMMON TOBACCO-MOSAIC VIRUS IN TOMATO FIELDS BY MEANS OF VINE LIFTERS

M. B. Linn and H. W. Anderson

In connection with tomato-dusting demonstrations for Septoria blight control in Cook County, Illinois, during the summer of 1942, it was noted that the use of vine lifters on the dusting equipment apparently was responsible for an unusual amount of mosaic in the dusted area. This condition was noticeable from a distance of several hundred feet by the pronounced greenish-yellow color and stunting of the affected plants. Close inspection and subsequent inoculation tests with tissues from these plants indicated that no virus other than the tobacco-mosaic virus, typical strain, was the cause of the disease. No doubt, other workers having occasion to use power dusters and sprayers in tomato fields may have observed a similar phenomenon.

It is estimated that approximately 5% of the plants in the field had mosaic at the time the first application of dust was made on July 21. Counts made at the time of the first picking revealed that an average of 95% of the plants in the dusted rows had mosaic, as compared with 43% in the undusted rows alongside. This would suggest that the spread of the virus in the treated area was due in large part to the vine lifters[1/] fitted on the power duster and the Farmall tractor that pulled it.

One can only speculate on what effect mechanical injury, such as bending, twisting, and the like, may have had on the severity of the symptoms. No doubt, several leaves and branches on each plant passing over the lifters were subjected theoretically to many inoculations over the period of treatment (4 1/2 weeks). Plants outside the treated area were likely to have been exposed to inoculation, if at all, only a relatively few times and on only a few leaves.

From the standpoint of actual damage done to the vines by the lifter-fitted wheels, it was calculated roughly that less than 2% of the branches, which could have been run over had no lifters been used, actually were damaged appreciably. This speaks well for the efficiency of the particular lifters we used.

It would appear that under some circumstances not well known at the present time the use of vine lifters may result in severe mosaic infections -- so severe, in fact, as to nullify any benefits from the use of the lifters and even the benefits from dusting itself.

The writers would appreciate any comments that other workers may have on the subject of vine lifters in relation to the spread of the tomato-mosaic virus.

(DEPARTMENT OF HORTICULTURE, UNIVERSITY OF ILLINOIS).

1/ The plans for these lifters were drawn from pictures kindly furnished us by Dr. J. D. Wilson, of the Ohio Agricultural Experiment Station, at Wooster.

EARLY APPEARANCE OF LATE BLIGHT OF POTATO IN OREGON IN 1942

C. E. Owens

In the Plant Disease Reporter for July 1/15, 1942, attention was called to the exceptionally early appearance of late blight caused by Phytophthora infestans on potatoes in certain states east of the Mississippi. Later issues of the Reporter have carried articles calling further attention to the widespread occurrence of this disease during the current season.

It may be of interest to have this additional report from Oregon. The first specimens of late blight for the season were received at the State College on June 9, 1942. These came from Aurora, Clackamas County. Other reports with specimens were received from Reedsport in Lane County on June 9, and from Scio in Linn County on June 20. By the end of June, late blight was well distributed in scattered localities all over the Willamette Valley and along the coast and lower Columbia River.

In western Oregon more or less late blight occurs on potatoes, usually during the fall after considerable rain has fallen. There is seldom enough rain in the Willamette Valley before September 1 to cause an outbreak of late blight. Along the coast and the lower Columbia River, blight frequently appears earlier than in the Willamette Valley because of the higher humidity, with fogs and mists in these regions.

In the season of 1941, the rains began about August 20 and continued throughout September and October. As a result, the outbreak of foliage blight and tuber rot caused by Phytophthora infestans was the worst experienced in many years. The heavy build-up of blight in the fall of 1941, followed by the almost continuously cool, cloudy weather and frequent rains during May and June of 1942, seemed to be an ideal situation for an early appearance of late blight this season on early planted potatoes.

Early in July of this year, the weather cleared and throughout most of western Oregon remained dry the remainder of the summer and fall. The blight was correspondingly checked in many localities. However, along the coast and in places along the Columbia River there was some rain and frequent fogs during July, August, and September, so that in these localities there was a continued build-up of blight throughout the summer and early fall. This was noted particularly in Multnomah County, which lies along the Columbia River extending from Portland to the Cascade Mountains. In this county there is a considerable acreage devoted to the growing of certified seed potatoes. These potatoes are planted mostly in July and reach maturity in October. Because of the early appearance of late blight on early-planted potatoes in numerous localities, these late-planted potatoes were exposed to inoculation almost as soon as they came up. Many farmers were thus caught napping and did not start spraying or dusting until the blight had a good start in many fields. Thus this locality afforded a good opportunity to observe the effectiveness of sprays and dusts applied by the growers to control this disease.

The 2 materials most widely used were bordeaux and copper-lime dust. In one or two instances cuprocide dust was used. All 3 of these materials

gave evidence of their value, depending upon timeliness and frequency of application. The most nearly perfect (practically 100%) case of control observed was a field in which copper-lime dust (20-80) had been used. The first application was made before any blight appeared and applications were repeated at aproximately 1-week intervals throughout August and September. No case of such frequent applications of bordeaux or cuprocide was observed but cases were noted where fairly satisfactory control was obtained with fewer applications of these materials, leading to the conclusion that if they had been used with the same timeliness and frequency as was the copper-lime dust, equally satisfactory results might have been obtained.

A striking phenomenon observed in many fields was the fact that blight lesions appeared on stems before they became abundant on the leaves. This was noticeable in a field dusted with cuprocide. At the time the observation was made there were many dark, conspicuous lesions on the stems but the foliage had a healthy, dark-green appearance, so that from a short distance one would not suspect the presence of blight in the field. Other fields nearby which had not been properly protected were badly blighted. This was good circumstantial evidence that even though there was considerable blight in this field, mostly stem lesions, when dusted, the cuprocide dust had very effectually prevented further spread of the disease.

A number of cases of typical late blight on tomato were observed, but tomatoes were not attacked nearly to the extent that they were in the season of 1941. In several instances there was good circumstantial evidence that the blight had spread directly from potatoes to tomatoes. Cross inoculations from potato tubers to tomato fruits and vice versa substantiated the field observations.

(OREGON AGRICULTURAL EXPERIMENT STATION).

DISEASES OF SOYBEANS AND PEANUTS IN MISSISSIPPI

J. A. Pinckard

The soybean crop in Mississippi has been estimated at approximately 3,060,000 bushels of beans as of October 1. Although soybeans have been grown here for some years it is a relatively new crop and destructive epidemics of diseases have not yet been reported from this State. In the older soybean growing area, the Mississippi-Yazoo delta, we have found several of the common soybean diseases. Two were sufficiently destructive this year to cause us to be alarmed for a few weeks.

Bacterial pustule (Bacterium phaseoli var. sojense) [Xanthomonas] appeared on the lower leaves just before blossom time and caused upward progressive defoliation. Diseased fields assumed a yellowish appearance during mid June in the Mississippi delta. Rainfall above normal was experienced in this area. Other areas of the State, northeast and east-central, were undergoing severe drought conditions at this season and later. The disease was somewhat less conspicuous in the dry areas although additional infections continued to appear through the summer.

Other similar bacterial leaf spots may have been present. Of particular importance is the fact that these leaf spots were found widely distributed throughout the State, indicating perhaps that they have been here for some time.

Downy mildew (Peronospora manshurica) was found in all fields examined. It appeared to be worse in moist regions, reaching a peak in late June. This disease was also found to be common in the drought affected areas. The geographical distribution of the disease in the State indicated it to be a long-time resident.

Mosaic (virus) was scattered and sporadic. Its presence was usually explained by the owner obtaining seed from unknown sources. The disease did not seem to spread noticeably. Losses were very insignificant except on one farm visited.

Sclerotium blight (Sclerotium rolfsii) was observed commonly in small spots where soybeans were planted broadcast for hay. This disease is exceedingly common on vegetables and ornamentals but it did not appear to be widespread on soybeans.

The damage caused by these diseases on soybeans cannot be estimated with much accuracy although it is probably between 5 and 10% for the entire State. The greater portion of this damage is caused by the combined action of bacterial leafspots and downy mildew. These 2 diseases occurred together on the same leaves, causing an alarming defoliation. No varietal resistance of value was observed last year.

The peanut crop in Mississippi rose from 14,040,000 pounds last year to an estimated 41,750,000 pounds (October) this year. It being a new crop in this State, many farmers experienced poor stands. No seed treatment was used insofar as we were able to determine.

Leafspot (Cercospora sp.) was very common throughout the State. In some places it appeared in early June. Many growers have confused leafspot with normal maturity of the vines, consequently the losses are not generally recognized.

Sclerotium blight (Sclerotium rolfsii) was the only other disease observed on peanuts this year. The damage was slight.

Leafspot alone probably accounted for 10 or 15% loss of the crop this year. The damage from seedling diseases, or poor stands, undoubtedly reduced the crop appreciably. It is estimated that 60% of a normal stand was obtained.

(MISSISSIPPI AGRICULTURAL EXPERIMENT STATION).

COTTON BOLL ROTS AND THE FUNGI ASSOCIATED WITH THEM IN OKLAHOMA IN 1942

W. Winfield Ray

As a part of a project on cotton boll-rot diseases, a collection of samples from 11 counties in Oklahoma was made in September 1942. Isolations were made from pieces of tissue removed from small sectors of lesions that were disinfested in a calcium hypochlorite solution and plated on water agar.

The small water-soaked lesions characteristic of bacterial blight caused by Phytomonas malvacearum (E. F. Sm.) Bergey et al. [Xanthomonas] were extremely plentiful in almost all fields examined. Older lesions were in practically every instance found to contain a fungus, and it was from these that most of the isolations were made. A small number of fungous and bacterial lesions were found surrounding punctures made by sucking insects or larvae.

Previous cotton boll-rot surveys reported for Oklahoma by Weindling and Miller[1/] have disclosed the scarcity of the anthracnose fungus, Glomerella gossypii (South.) Edg. This year the fungus was found in 3 counties, and these records added to those already reported bring the total number of counties yielding G. gossypii to 7. These 7 counties are Lincoln, McCurtain, Muskogee, Okfuskee, Pushmataha, Sequoyah, and Tulsa.

Species of Alternaria were by far the most common fungi associated with boll rots. They were found in 100% of the samples and comprised 60% of the total fungi isolated. The frequency of occurrence of the various fungi in cotton bolls taken in the survey is indicated in Table 1.

Table 1. Frequency of occurrence of fungi in cotton bolls collected in 11 counties of Oklahoma in 1942.

	Distribution of the fungi			
	In 27 samples		In 233 bolls	
	Number	Percent	Number	Percent of total fungi
Alternaria spp.	27	100	142	60.16
Glomerella gossypii	3	11.1	6	2.54
Fusarium moniliforme	9	33.3	18	7.63
Fusariella spp.	4	14.8	5	2.12
Fusarium spp.	18	66.6	47	19.92
Others	12	44.4	18	7.63

(OKLAHOMA AGRICULTURAL EXPERIMENT STATION).

THE RATE OF APPLICATION OF CERESAN TO COTTON SEED

W. Winfield Ray

In a letter to Dr. C. H. Arndt from Dr. H. D. Barker that was later made available to all members of the Cotton Disease Council, it was suggested that experimental evidence concerning the rates of application of New Improved Ceresan necessary to disinfest and protect cotton seed was needed.

1/ PDR 23: 29-32. 1939; 23: 329-334. 1939; 24: 417-423. 1940; 25: 519-521. 1941.

Scattered evidence, principally in the form of papers presented before the members of the Cotton Disease Council at their annual meetings, has definitely indicated the feasibility of reducing the amount of Ceresan to be applied to cotton seed. At the present time the Council recommends the use of 1 1/2 ounces of Ceresan for each bushel of seed.

Since no information was available concerning the minimal amount of Ceresan necessary for effective seed treatment of cotton grown under the relatively dry conditions encountered in Oklahoma, experiments involving rate-of-application of Ceresan were undertaken in the spring of 1942 at the Agricultural Experiment Station farm at Perkins, Oklahoma. Stoneville 2B cotton seed provided for the cooperative seed treatment tests for 1942 was used. Three types of seed were employed for treatment with Ceresan: (1) fuzzy, (2) reginned (all but about 10% of the lint was removed mechanically) and (3) acid-delinted (heavy fraction obtained by gravity grading). To aliquots of each seed type Ceresan was applied at the rates of 1/2, 1, and 1 1/2 ounces per bushel. The seed were planted 3 to each hill in 60 hills for each 50 feet of row. Each treatment for each type of seed was replicated 4 times.

The results of the tests are summarized in Table 1. The data were analyzed statistically by the analysis-of-variance method. Ceresan treatment, regardless of the rate of application and the type of seed employed, resulted in stands statistically superior (odds 99:1) to the nontreated checks. No significant differences exist for the amount of Ceresan applied to the seeds of the 3 types when expressed in percentage of the final stand. The data likewise indicate the superiority (odds 99:1) of acid-delinted gravity-graded seed over the fuzzy and reginned. This feature has consistently occurred in field data over a period of years in Oklahoma tests. Usually when fuzzy and reginned seed are tested, the latter gives better stands, but when such seed is too severely machined, as the seed used here was, injury to the seed in the nature of cracks and crushing occurs. The data indicate that larger amounts of Ceresan may cause further injury to the reginned seed.

Table 1. Final stand of seedlings (percent) from 3 types of cotton seed treated with New Improved Ceresan at varying rates.*

Seed Type	Rate of Ceresan in ounces per bushel				
	Check	1/2	1	1 1/2	Mean
Fuzzy	66.8	77.0	81.5	81.4	76.7
Reginned (Heavily)	68.7	81.2	79.6	76.2	76.4
Acid-delinted (Heavy)	84.6	90.3	87.7	91.2	88.4
Mean	73.3	82.8	82.9	82.9	80.5

* Each number is the mean percentage of stand for 4 replications.

These tests, although they represent but one year of trial, definitely indicate that the amount of Ceresan to be applied to fuzzy, reginned, and acid-delinted seed can be reduced considerably below the 1 1/2 ounces now generally recommended.
(OKLAHOMA AGRICULTURAL EXPERIMENT STATION).

PRELIMINARY EVIDENCE SUGGESTS GUAYULE MAY BE RESISTANT TO THE ROOT KNOT NEMATODE

Wm. G. Hoyman

The need for more information on the diseases of guayule, Parthenium argentatum, has prompted the publication of the results obtained to date with respect to infestation of this rubber-producing plant by the root knot nematode, Heterodera marioni.

During the summer of 1941, the Department of Plant Pathology, University of Arizona, was requested to investigate the unhealthy condition of a squash planting at Sahuarita, Pima County, Arizona. Sahuarita is only a few miles from the former location of the Intercontinental Rubber Company where extensive guayule plantings were grown from 1916 to 1922. The investigation revealed that a heavy infestation of the root knot nematode was causing the death of many plants. This exact area where the nematodes were known to occur was selected for transplanting 13 guayule plants (main roots 6 to 8 inches in length) March 20, 1942. On the same date, soil from this area was placed in six 10-inch pots and one plant transplanted in each pot. The pots were placed in an enclosure near the greenhouse. Three months later Honey Dew melons were seeded in each pot as indicator plants. The unhealthy appearance of the melon vines in August suggested the examination of the roots for nematode infestation and this was found to be the case. The examination was made by inverting the pots and removing the contents without disturbing the soil and guayule root systems. A casual examination of the guayule roots growing adjacent to the sides and bottoms of the pots indicated a trace of root knot symptoms on one plant. The guayule plants were returned to the pots and allowed to grow until October when a more careful search was made for nematode infestation. The root systems were separated carefully from the soil, washed, and examined thoroughly for nematodes. A very slight infestation was found on one of the 6 plants. The root systems of the plants growing at Sahuarita were examined at the same time and no infestation was found. Owing to circumstances beyond control, the plants growing in the field were not irrigated after July. A lack of sufficient water for normal growth may have influenced the possibility of nematode infestation.

This limited amount of preliminary evidence indicates the plants have remained highly resistant to root knot nematode infestation to date. Experiments are in progress to substantiate this preliminary evidence.
(DEPARTMENT OF PLANT PATHOLOGY, UNIVERSITY OF ARIZONA, TUCSON, ARIZONA).

TOBACCO DISEASES IN MARYLAND IN 1942

E. A. Walker

Blue mold (Peronospora tabacina) appeared on May 4, which is much later than usual. The season had been very dry until May 21-23 when continuous rains hastened the spread and stimulated the growth of blue mold which became very destructive to medium and small size plants. Larger plants were not seriously damaged. Blue mold was generally light this year, although persistent in untreated beds so that transplanting was delayed some 10 days in spite of the drought during transplanting season. Late beds were hurt worse by blue mold than early beds. Field infection has not been observed in Maryland. Spray and gas treatments are being adopted by increasing numbers of our tobacco growers.

Anthracnose (Colletotrichum sp. or Gloeosporium sp.) appeared in the plant beds by May 15 as a general infection over the tobacco-growing area and became very destructive by May 25, killing and dwarfing plants. Many beds near Annapolis were a complete loss to growers. Many diseased plants were set into fields and anthracnose continued to develop in the field as leaf spots, and midrib and stem cankers, and persisted to the flower head. This disease was most severe in wet poorly drained soil in both field and seed bed. Seed treatment may become necessary to check its spread.

Mosaic (virus - Marmor tabaci var. vulgare) was widespread in the field this year, although less prevalent than it was in the 1941 season. Only a few fields were found showing no mosaic. Numerous fields were visited where 95% or more of the plants had mosaic developing on sucker shoots following topping. Considerable leaf-burning mosaic developed following hot days.

Ring spot (virus - Annulus tabaci var. virginiensis) was scattered to general in most field plantings, causing leaf distortion and plant dwarfing. Growers are not much concerned with this disease.

Frenching (nutritional) was observed more frequently than usual, probably owing in part to the wet growing season. It was found as readily in low as in elevated areas in the field. Some fields had only isolated plants showing the frenching symptoms.

Houseburn (various fungi) was worse in 1942 than usual, owing to the wet curing season. Early and medium late planted Maryland tobacco ripened together and caused a rush in the harvest season. Lower leaves fired in the field and farmers cut continuously to save the crop. Barn space was inadequate, and tobacco was crowded in the available room with little chance for rehanging. Damp weather persisted and growers did not resort to heat. Daytime humidity was high and night air was saturated with moisture; stalks dried out very slowly. Toward the end of the curing season continuous driving rains caused wet leaves to drape around the green stalk and rots quickly deteriorated the cured leaves. Much tobacco was darkened by the wet weather after curing. Many growers have lost 50% of their crop and the loss from houseburn for the State will exceed 15%, with further loss expected from stripping and packing the crop while too highly cased.

Wildfire (Phytomonas tabaci) [Pseudomonas] appeared in plant beds later

than usual this year. Most plants were large enough to set out when the disease attacked following heavy rains of May 21-23. Many beds showed systemic infection. The disease was carried into the field and caused a severe outbreak of blackfire following hard soaking rains at topping time. Much tobacco was damaged by leaf necrosis and was left uncut in the field. The loss was estimated in the plant beds at 3% and in the field at 12%. Spraying plant beds thoroughly with bordeaux mixture (4-6-50) 3 to 4 times early in the season prevents this disease.

Black root rot (Thielaviopsis basicola) was present to some extent in seed beds used continuously for 4 or more years. It is kept in check by selecting new plant bed sites each year or treating the old beds with chloropicrin.

Brown root rot (nutritional) was less abundant than usual and was observed only in small areas in a few fields.

Fusarium wilt (Fusarium oxysporum var. nicotianae) appeared throughout the season as scattered infections in 50% of the fields. Loss in some fields amounted to about 7% with 12% of plants diseased. Strains of Maryland tobacco showing resistance to wilt are Rawling's, Robinson's, #21, and #43.

Cercospora leaf spot (Cercospora nicotianae) appeared late in season and has spotted the cured leaf with white (frog-eye) and green spots. This disease gives an unsightly appearance to the leaf when offered for sale but does not affect the sale price of cigarette tobacco. About 20% of cured leaves showed infection. Loss from Cercospora leafspot has reduced the poundage of tobacco by about 5% in Maryland.

Some brown spot disease (Macrosporium) was observed in the maturing tobacco following wet periods. It spread rapidly and caused some "firing" of the leaves. This has not been a serious disease in Maryland, and the loss this year was about 2% which is the average for most seasons. (MARYLAND AGRICULTURAL EXPERIMENT STATION).

SMALL GRAIN DISEASES IN VIRGINIA 1942

S. B. Fenne

The first aecial infection of black stem rust, Puccinia graminis tritici, was observed in Wythe County, May 4. During the third week of May, cool weather and heavy rains occurred. Pycnial and aecial infection increased rapidly on barberry, but with no spread to grain. Leaf rust, Puccinia rubigo-vera tritici, was observed increasing slowly on wheat in the flowering stage. A week later wheat was in the head to milk stage and stem rust was spreading from barberries to grain. It was first observed in Montgomery and Bedford Counties on wheat on May 26; in Botetourt County on May 27; and on rye and barley in Grayson County May 27. Wheat leaf rust increased rapidly in all counties during the week of May 28, averaging 10 to 15% infection in practically all fields. Warm, rainy and foggy weather during the first week of June caused numerous new pycnial and aecial infections on barberry leaves. The heaviest rust observed was on wheat and barley in fields adjacent to barberry bushes. Stem rust was reported in all counties of the State, increasing rapidly near the end of the season.

Leaf rust was general.

Numerous local showers continued during the week of June 13. Stem rust infection occurred in amounts from a trace to 90% with a prevalence of 100%. The disease apparently got a much earlier start in Northern Virginia than it did in Southwest Virginia. The last new pycnial and aecial infections were observed during the week of June 13. Comparatively large amounts of crown rust of oats, Puccinia coronata, were observed during this week.

The weather during the period June 18 to July 9 was warm with cool nights and considerable rain. Much barley, rye, and wheat had been harvested at that time and oats were ready to be harvested. Conditions were ideal for both leaf and stem rust infection, and leaf rust was general throughout the State.

In practically all observations made throughout the State there was a distinct difference between areas where barberry bushes had been eradicated and in areas where barberry bushes had not been eradicated. In some cases, fields less than 1/2 mile apart varied as much as 60% in severity. Black stem rust on wheat has been more severe this year than at any time during the past 10 years. A conservative estimate places the loss for the State at 10%. Some damage was sustained even in the areas where barberries had been eradicated. Here infection apparently originated from outlying areas. Loss to rye and barley was only a trace, and to oats 2%.

Leaf rusts on grain appeared late in the season, though generally distributed. It was estimated that approximately 1% loss occurred to wheat and a trace to barley and rye.

Nematodes, Anguina tritici, did less damage this past season than in average years. It is estimated that only 0.3% loss occurred in Virginia. In the past nematode galls frequently composed 75 to 90% of the screenings of some flour mills in the State, while this year the screenings examined at a number of mills either failed to show any nematodes or only 10 to 20%.

Scab, Gibberella zeae, was not present until late in the season. This can be accounted for by the fact that the first part of the growing season was very dry, followed by an excessive rainfall just at harvest time. Scab developed rapidly late in the season but did not cause any appreciable loss.

Foot rots (various organisms) did not cause the damage that they usually cause. This probably can be accounted for because of the dry weather during the fall of 1941 and the early spring of 1942, and probably to a less extent by the increased practice of seed treatment.
(EXTENSION PLANT PATHOLOGIST).

CHECK LIST REVISION

Freeman Weiss

VACCINIUM (ERICACEAE)

VACCINIUM ANGUSTIFOLIUM Ait., LOWBUSH BLUEBERRY. Low shrub of Growth Regions 22, 23, 24, 26, 27, bearing edible fruit picked commercially but not cult. Including V.CANADENSE Kalm, CANADA BLUEBERRY, of more northerly range.

Bifusella vaccinii Tehon, on leaves. N. H., N. J. (Not Hysterium vaccinii Carm., which = Gloniopsis vaccinii (Carm.) Boughey and is not known in the U. S.)
Exobasidium vaccinii (Fckl.) Wor., red leaf spot, leaf gall. Me., Wis.
Lophodermium maculare (Fr.) De Not., on leaves. N. J.
Microsphaera alni var. vaccinii (Schw.) Salm., powdery mildew. Me. to Mass. and Wis.
Monilia peckiana Sacc. & Vogl., on stems. N. Y.
Pestalotia vaccinii (Shear) Guba, on leaves. Me.
Pucciniastrum goeppertianum (Kuhn) Kleb., rust witches'-broom (III). Me. to Minn. O and I on Abies spp.
P. myrtilli (Schum.) Arth., leaf rust (II, III). Me. to Pa. and Wis. O and I on Tsuga canadensis.
Ramularia effusa Pk., leaf spot. Mich., Wis.
R. vaccinii Pk. Md., N. Y., Wis.
Septoria difformis Cke. & Pk., leaf spot. N. Y.
Valsa delicatula Cke. & Ell., on twigs. Mass., N. J.

VACCINIUM ARBOREUM Marsh., FARKLEBERRY. Large shrub or small tree of Growth Regions 17, 20, 25, 27, 28, 29, 30; cult. for edible fruit, Zone VII.

Exobasidium vaccinii (Fckl.) Wor., leaf gall. Ala., Fla.
Microsphaera alni var. vaccinii (Schw.) Salm., powdery mildew. Mass. to Ga. & Ill.
Mycosphaerella punctiformis (Pers. ex Fr.) Schroet., on leaves. Ga.
M. vaccinii (Cke.) Schroet. Ga.
Ophiodothella vaccinii Boyd, leaf spot. Md. to Ga., Texas and Ill.
Pestalotia vaccinicola Guba, leaf spot. Fla.
Phyllosticta vaccinii Earle, leaf spot. Ala., Fla., Miss., Texas.
Phymatotrichum omnivorum (Shear) Dug., root rot. Texas.
Physalospora obtusa (Schw.) Cke., on branches. Ala.
Septoria albopunctata Cke., leaf spot. Fla., S. Car., Texas.

VACCINIUM CORYMBOSUM L., HIGHBUSH BLUEBERRY. Upright shrub of Growth Regions 22, 23, 24, 26, 27, 28, 29; bears edible fruit; picked commercially and cult. to a limited extent chiefly in Mass. and N. J. Including several similar plants as V. ATROCOCCUM (Gray) Heller, DOWNY B., and V. VIRGATUM Ait., RABBIT EYE B., of the southern part and V. PALLIDUM Ait., BLUE RIDGE B., of the general range.

VACCINIUM CORYMBOSUM cont.

Alternaria sp., berry rot, dieback. Mass., N. J., N. Car.
Botryosphaeria ribis (Tode ex Fr.) Gross. & Dug., on twigs. N. J.
Botrytis sp., twig blight, dieback. N. J., Wash.
Cuscuta sp., dodder. Pa.
Diaporthe vaccinii Shear, twig blight. Mass., N. J., N. Car., Wash.
Exobasidium vaccinii (Fckl.) Wor., leaf gall. General.
Gibbera compacta (Pk.) Shear (Venturia c. Pk.), on leaves. La., Me., Mass., Wis.
Glomerella cingulata var. vaccinii Shear, berry rot. N. J.
Gloriopsis sp., on leaves. Va.
Helminthosporium inaequale Shear, on twigs. N. J.
Leptosphaeria coniothyrium (Fckl.) Sacc., on twigs. Oregon.
Leptothyrium conspicuum Dearn. & House, on leaves. N. Y.
Lophodermium maculare (Fr.) De Not., on leaves. Ga.
Melanospora destruens Shear, on roots & stems. Mass., N. J., N. Car.
Meliola nidulans (Schw.) Cke., on twigs. Fla., N. J.
Microsphaera alni DC. ex Wint. var. vaccinii (Schw.) Salm., powdery mildew. Widespread.
Monilinia vaccinii-corymbosi (Reade) Honey, brown rot, twig blight. Ind., Me., Mass., N. J., N. Y.
Mycosphaerella vaccinii (Cke.) Schroet., on leaves. N. Y.
Myriangium asterinosporum (Ell. & Ev.) J. H. Miller, on scale insects infesting stems. N. J., N. Car.
Pestalotia vaccinii (Shear) Guba, on stems & leaves, Mass., N. J., N. Car.
Pezizella oenotherae (Cke. & Ell.) Sacc., on leaves.
Phomopsis sp., stem gall. Wash.
(P. vaccinii Shear): Diaporthe vaccinii.
Phyllosticta spp., leaf spot. Ala., Fla., N. J.
P. cyanococci Dearn. & House, N. Y.; P. vaccinii Earle, N. J.
Physalospora obtusa (Schw.) Cke., on twigs. N. J., N. Car.
Phytomonas tumefaciens (EFS. & Town.) Bergey, crown gall. Mass., Miss., Wash.
Pucciniastrum goeppertianum (Kühn) Kleb., rust witches'-broom (III).
Ramularia vaccinii Pk., on leaves. N. J., N. Y.
Rhizoctonia sp., ectotrophic mycorhiza, Ind.
Rhytisma vaccinii Schw. ex Fr., tar spot. Widespread.
(Sclerotinia vaccinii-corymbosi Reade): Monilinia v., twig blight.
Septoria differmis Cke. & Pk., leaf spot. N. Y.
Valsa delicatula Cke. & Ell., on twigs. N. J.
Stunt, unidentified virus. N. J., N. Y., N. Car.

VACCINIUM MACROCARPON Ait., CRANBERRY. Creeping evergreen vine of Growth Regions 22, 23, 24, 25, 26, 27; source of commercial vars. cult. for edible fruit chiefly in Mass., N. J., Wis., Oregon & Wash. Including V. OXYCOCCUS L., SMALL CRANBERRY, a similar but smaller plant; of more northerly range, and also its var. INTERMEDIUM Gray, of the Pacific Northwest.

VACCINIUM MACROCARPON cont.

Acanthorhyncus vaccinii Shear, blotch rot of berries, also on leaves. Me. to N. Car. and Wis.; Pacific Northwest.

Alternaria sp., storage rot. N. J., Wis., Oregon, Wash.

(Anthostomella destruens Shear): Melanospora destruens.

Arachniotus trachyspermus Shear, on berries, ? storage rot. N. J.

Botrytis cinerea Pers., blossom rot. Wash.

Ceuthospora lunata Shear, black rot of berries, also on leaves. Mass., N. J., Oregon, Wash., Wis.

Cladosporium oxycocci Shear, on leaves. Mass., N. J.

(Cytospora delicatula Shear): Valsa delicatula.

Diaporthe vaccinii Shear, storage rot. Mass., N. J., Oregon, Wash., Wis.

Diplodia vaccinii Berl. & Roum., on stems. Mass., N. J., Oregon, Wash.

Exobasidium oxycocci Rostr., rose bloom, shoot hypertrophy. Mass., N. H., Oregon, Wash.

E. vaccinii (Fckl.) Wor., red leaf spot. General.

Fusicoccum putrefaciens Shear. Conidial stage of Godronia cassandrae.

Gibbera compacta (Pk.) Shear, leaf smudge. Me. to N. J. & Wis., Pacific Northwest.

Gloeosporium minus Shear, storage rot. Md., N. J.

Glomerella cingulata (Ston.) Spauld. & Schrenk var. vaccinii Shear, bitter rot of berries, also on leaves. Mass., N. J., N. Car., Oregon, Wash., Wis.

Gnomonia setacea (Pers. ex Fr.) Ces. & De Not., on stems. Oregon, Wash.

Godronia cassandrae Pk. (Fusicoccum putrefaciens Shear), end rot. General.

Guignardia vaccinii Shear, early rot, scald, blast. General.

Helminthosporium inaequale Shear, berry rot. N. J.

Leptosphaeria coniothyrium (Fckl.) Sacc., on stems. Oregon.

(Leptothyrium oxycocci Shear): Godronia cassandrae.

L. pomi (Mont.) Sacc., on fruit. N. J.

Lophodermium hypophyllum (Dearn. & House) Shear, on leaves. Mich., Minn., N. Y., Oregon, Wash., Wis.

L. oxycocci (Fr.) Karst. Me., Mass., Mich., Alaska.

Melanospora destruens Shear, storage rot. Mass., N. J., Wis.

Microsphaera alni DC. ex Wint. var. vaccinii (Schw.) Salm., powdery mildew. Ala., N. J., Ohio.

Monilinia oxycocci (Wor.) Honey, hard rot, twig blight. Me., Mass., Oregon, Wash., Wis.

Mycosphaerella nigromaculans Shear, black spot. Me., Mass., Oregon, Wis., Wash.

(M. oxycocci Dearn. & House): Guignardia vaccinii.

M. vaccinii (Cke.) Schroet., on leaves. Mass., N. J.

Myxofusicoccum callunae Shear. Conidial stage of Pseudophacidium callunae.

Naevia oxycocci Dearn., witches'-broom. Me., Mich., N. H., N. Y.

VACCINIUM MACROCARPON cont.

Penicillium spp., blue mold rot. Cosmopolitan.
Pestalotia vaccinii (Shear) Guba (P. guepini Desm. var. vaccinii Shear), on leaves, occasional storage rot. General.
Pezizella oenotherae (Cke. & Ell.) Sacc., on leaves, also storage rot. Mass., N. J., Oregon, Wash., W. Va.
Phacidium vaccinii Fr. var. oxycocci Dearn. & House, on leaves. N.Y.
Phomopsis vaccinii Shear. Conidial stage of Diaporthe vaccinii.
Phyllosticta putrefaciens Shear, on leaves, also berry rot. Mass., N. J.
Physalospora obtusa (Schw.) Cke., on berries. Mass., N. J.
Plectothrix globosa Shear, on leaves. N. J.
Pseudophacidium callunae Karst., on stems & leaves. Oregon, Wash.
Psilocybe agrariella Atk. var. vaccinii Charles, fairy ring. Mass., N. J.
Pucciniastrum myrtilli (Schum.) Arth., rust (II, III). Oregon, Utah, Wash.
Ramularia multiplex Pk., on leaves. Mich., N. Y., Wis.
(R. nigromaculans Shear): Mycosphaerella n.
Rhabdospora oxycocci Shear, on dead leaves. N. J.
(Sclerotinia oxycocci Wor.): Monilinia oxycocci.
Septoria shearеana Sacc. & Trotter , on leaves & old berries. N.J.
Sphaeronema pomorum Shear, storage rot. Mass., N. J.
Sporonema oxycocci Shear, storage rot. Me. to N. J., Wis. and Pacific Northwest.
(S. pulvinatum Shear): Pezizella oenotherae.
Strasseria oxycocci Shear, on dead leaves. Mass., N. J.
Synchytrium vaccinii Thomas, red leaf gall. Me. to N. J.
Valsa delicatula Cke. & Ell., Mass., N. J., Oregon, Wash.
False blossom, Vaccinium virus 1 Dobroscky ex Smith (Chlorogenus vaccinii Holmes). Me. to N. J., Mich., Wis., Pacific Northwest.

VACCINIUM MEMBRANACEUM Torr., BIG WHORTLEBERRY, and similar plants as V. MYRTILLUS L., MYRTLE W., V. OVALIFOLIUM Sm., OVAL-LEAF W., and V. SCOPARIUM Leib., GROUSE W. Small to large shrubs of the Pacific Northwest and N. Rocky Mt. States; fruit is picked commercially and also furnishes food for wild life.

Godronia cassandrae Pk., on twigs. Pacific Northwest.
Exobasidium parvifolii Hotson, leaf gall, witches'-broom. Oregon, Wash.
E. uliginosi Boud., rose bloom. Idaho, Oregon, Wash.
E. vaccinii (Fckl.) Wor., red leaf spot, shoot hypertrophy. Idaho, Mont., Wyo.
Leptothyrium conspicuum Dearn. & House, on leaves. Alaska.
Microsphaera alni var. vaccinii (Schw.) Salm., powdery mildew. Oregon, Wyo.
Pucciniastrum sp., leaf rust (II). Oregon, Wash. Associated with Peridermium ornamentale on Abies but connection not proved.

VACCINIUM MEMBRANACEUM cont.
Pucciniastrum goeppertianum (Kühn) Kleb., rust witches'-broom (III). Mont. to N. Mex., Calif. & Pacific Northwest.
P. myrtilli (Schum.) Arth., leaf rust (II, III). Mont. & Wyo. to Pacific Northwest.
Rhytisma vaccinii Schw. ex Fr., tar leaf spot. Alaska.
Trichopeziza coarctata Ell. & Ev., on dead twigs. Wash.

VACCINIUM MYRSINITES Lam., GROUND BLUEBERRY. Low evergreen shrub of Growth Regions 28, 29, 30; also V. VITIS-IDAEA L., COWBERRY, especially the var. MINUS Lodd., sometimes called MOUNTAIN CRANBERRY, of G. R.'s 23 & 26; and V. OVATUM Pursh, BOX BLUEBERRY of G. R.'s 1, 2, & 5, used for cut greens and furnishing food for wild life.

Ceuthospora latitans (Fr.) Höhn., on leaves. Alaska.
C. minima Cke. & Hark. Calif.
Coccomyces albidus (Phill. & Hark.) Sacc., on leaves. Calif.
Exobasidium vaccinii (Fckl.) Wor., leaf gall. Alaska, Fla., Me., N.Y.
Gibbera vaccinii Sow. ex Fr., on stems. Alaska.
Godronia cassandrae Pk., Me., Alaska.
Lophodermium maculare (Fr.) De Not. and L. melaleucum (Fr.) De Not. var. epiphyllum Zeller, on leaves. Oregon.
L. oxycocci (Fr.) Karst. Alaska.
Pestalotia maculiformans Guba & Zeller, leaf spot. Oregon.
Pezicula myrtillina Karst., on leaves. Calif.
Phyllosticta sparsa Bonar, leaf spot. Calif.
Pucciniastrum goeppertianum (Kühn) Kleb., rust witches'-broom (III). Calif., Minn., Oregon, Wash.
P. myrtilli (Schum.) Arth., leaf rust. Fla., N. H.
Venturia vaccinii Ell. & Ev., on leaves. Wash.

VACCINIUM STAMINEUM L., DEERBERRY, and V. NEGLECTUM (Small) Fern. Shrubs of Growth Regions 23, 24, 25, 26, 27, 28, 29; furnishing food for wild life.

Exobasidium vaccinii (Fckl.) Wor., red leaf spot. Md., N. Y.
Monilinia polycodii (Reade) Honey, on twigs & berries. N. Y.
Pestalotia ? vaccinii (Shear) Guba, on leaves. Miss.
Phyllactinia corylea Pers. ex Karst., powdery mildew. Miss., W. Va.
Pucciniastrum myrtilli (Schum.) Arth., leaf rust (II, III). Pa.
Rhytisma vaccinii Schw. ex Fr., tar leaf spot. N. J., N. Y., Tenn.
(Sclerotinia polycodii Reade): Monilinia polycodii.

VACCINIUM ULIGINOSUM L., BOG BILBERRY. Low shrub of Growth Regions 1, 4, 12, 13, 14, 23, 24, 26, 27; furnishes food for wild life.

Exobasidium vaccinii (Fckl.) Wor., leaf gall. Alaska, N. H.
Lophodermium maculare (Fr.) De Not., on leaves. Me., Mich.

VACCINIUM ULIGINOSUM cont.

Monilinia ledi (Nawaschin) Honey, on leaves & berries. N. Y.
Mycosphaerella vaccinii (Cke.) Schroet., on leaves. N. Y.
Podosphaera oxyacanthae (DC.) DBy., powdery mildew. Alaska.
Pucciniastrum goeppertianum (Kühn) Kleb., rust witches'-broom (III). Alaska.
P. myrtilli (Schum.) Arth., leaf rust (II, III). Me., N. H.
(Sclerotinia ledi Nawaschin): Monilinia ledi.

(DIVISION OF MYCOLOGY AND DISEASE SURVEY).

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